PT500 Electro-Mechanical Vibration Switch

User Manual

Installation, Operation, Maintenance

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PT500 Electro-Mechanical Vibration Switch Introduction

The PT 500 is an economical solution to provide basic vibration protection for your rotating or reciprocating machines. The PT 500 uses an inertia sensitive mechanism which actuates internal micro-switch contacts when the vibration level exceeds the adjustable setpoint. The PT 500 start-up delay feature prevents the switch from activating during the higher vibration levels present during the start-up of the machine so that the setpoint may be adjusted closer to the vibration levels present during normal operation or running speed of the machine.

The PT 500 is your "one stop shopping" for all electro-mechanical vibration switch applications. The unique design has all industry required environmental and hazardous area approvals. The E-coat option is suitable for offshore and very corrosive environmental applications. Universal mounting plate will mount in existing mounting holes when replacing older mechanical vibration switches.

Applications include:

- ✓ **Fans**
- ✓ **Cooling Motor/Fans**
- ✓ **Fin Fans**
- ✓ **Heat Exchangers**
- ✓ **Engines**
- ✓ **Reciprocating Compressors**
- ✓ **Centrifuges**
- ✓ **Rock or Coal Crushers**

PT500 Features

- ✓ **Wide operating temperature range of -40°C – 100°C (-40°F – 212°F)**
- ✓ **All industry environmental ratings**
- ✓ **Optional NEMA(E-coat),IP65 environmental rating**
- ✓ **Hazardous area agency approvals CSA, ATEX, CE**

Universal mounting

- ✓ **Local and remote reset**
- ✓ **Start up delay**
- ✓ **SPDT, (2) SPDT and gold plated contact options**

Specification

Function: Armature mechanism trips on high vibration and operates snap action switch.

Vibration Range: See How to Select "C"

Frequency Range: 0 to 3600 rpm

Set Point Adjust: 0 to 100% of range. Internal set point adjustment.

Local Reset: For field local reset of the switch

Remote reset with Start-up Delay: Applying reset coil voltage at start up holds mechanism from tripping delay about 3 seconds, after which the switch is automatically activated.

Reset Coil Power Supply:

95 ~ 250VAC@100mA, 50~60Hz or

20 ~ 30VDC @ 200mA

Temperature Limit: -40℃ to +100℃

Enclosure: Casted Aluminum

Environmental Rating : IP65

Switch Contact(s) Rating:

15A, 125VAC, 250VAC, 480VAC；1/8 HP 125VAC；1/4 HP 250VAC； 1/2A, 125VDC；1/4A, 250VDC

Gold plated contact: 0.1A 125VAC;0.1A 30VDC

Hazard Rating: See order information

TR CU : 1Ex d IIC T4T6X
1Ex d IIB+H2T4T6 X
№ TC RU C-US.ГБ05.B.00476
NANIO CCVE

ГОСТ 30852.0-2002 (МЭК 60079-0:1998), (кроме п. 27),
ГОСТ 30852.1-2002 (МЭК 60079-1:1998),
ГОСТ 30852.14-2002,
ГОСТ Р МЭК 60079-0-2011 (пп. 29.1-29.3, 29.11).

Physical

Temperature

Operation: -40°C ~ + 100°C (-40°F ~ +212°F)

Storage: -50°C ~ + 120°C (-58°F ~ +248°F)

Dimension

See attached drawing

Weight

PT500	1285g	(2.8 lbs)
PT500-13	205g	(0.45 lbs)
PT500-14	279g	(0.6 lbs)
PT500-15(PT500-17)	440g	(0.97 lbs)
PT500-20	112g	(0.25 lbs)

Order Information

PT500-ABC-DE

A: Hazardous Area Approvals

A = 0: CE Mark

A =1: Multiple Approvals (D=0，1)

CSA: Class I, Div 1, Groups B,C & D T4,T6

ATEX: II 2 G,Ex d IIB+ H_2T4T6

PCEC: Ex d IIB+ H_2T4/T6 Gb

CE Mark

A = 5: Multiple Approvals (D=5)

CSA: Class I, Div 1, Groups A, B, C & D ,T4,T6

ATEX: II 2 G,Ex d IIC T4T6

PCEC: Ex d IIC T4/T6 Gb

CE Mark

A = 6: Multiple approvals (D=0，1):

TR CU: 1Ex d IIB+H2T4T6 X

CE Mark

A = 7: Multiple approvals (D=5):

TR CU: 1Ex d IIC T4T6 X

CE Mark

B: Relay Contact

B = 1: SPDT

B = 2: (2)SPDT

B = 3: SPDT (gold plated contact)

B = 4: (2) SPDT (gold plated contact)

C: Full Scale

C = 1: 5g

C = 2: 2g

C = 3: 10g

D: Reset Power with Start-up Inhibit; Local Reset

D = 0: Local Reset only

D = 1: Remote Reset and Inhibit; Local Reset

D = 5: Remote Reset and Inhibit; No Local Reset

E: Conduit Entries/Mounting Plate or Mounting Stud

E = 1: 3/4" NPT, Mounting Plate PT500-13

E = 2: 3/4" NPT, Mounting Plate PT500-14

E = 4: M20×1.5, Mounting Plate PT500-14

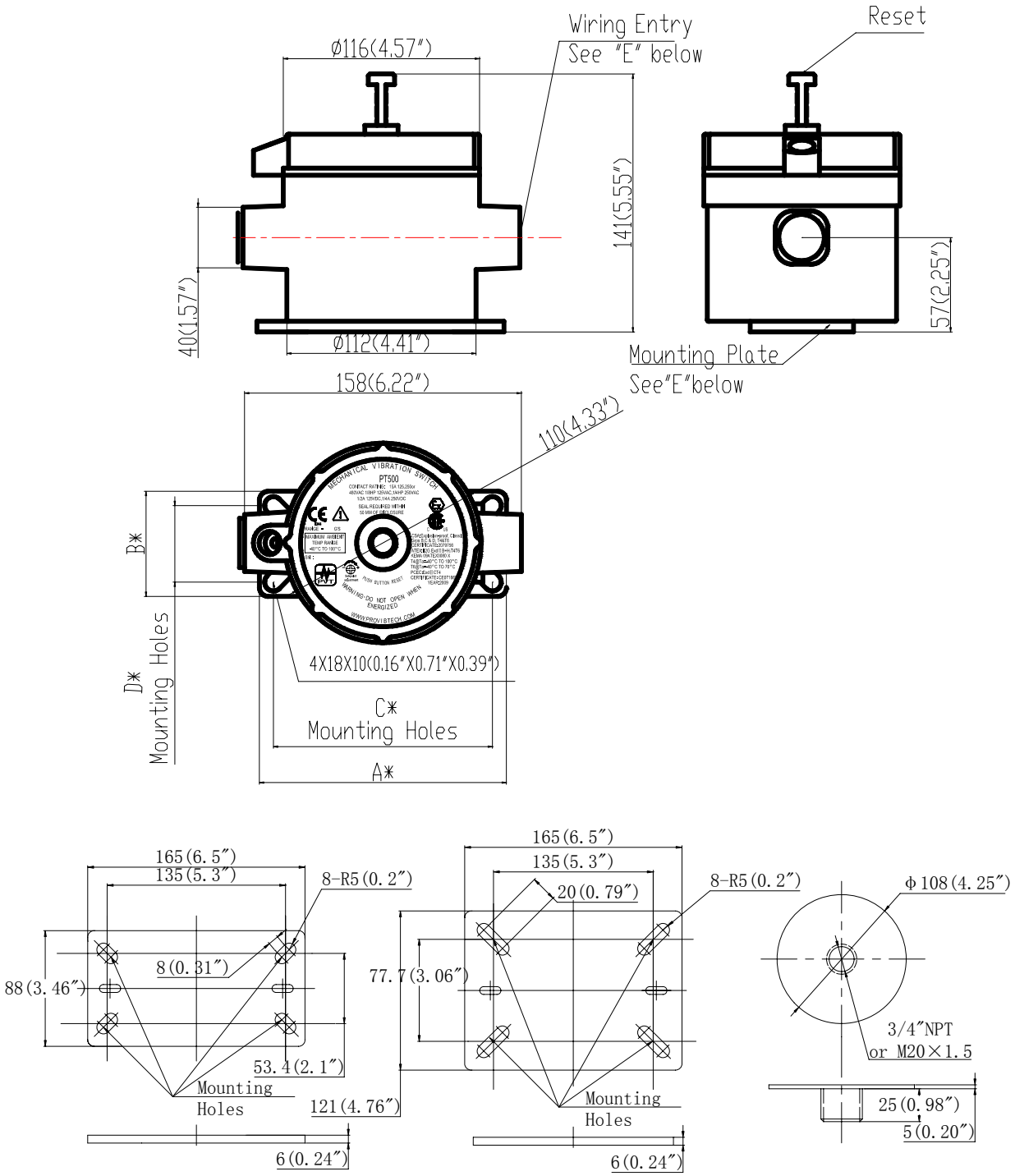
E = 5: M20×1.5, Mounting Plate PT500-13

E = 6: 3/4" NPT, Mounting Stud 3/4" NPT

E = 7: M20×1.5, Mounting Stud M20×1.5

Installation

Mechanical Outline Drawings



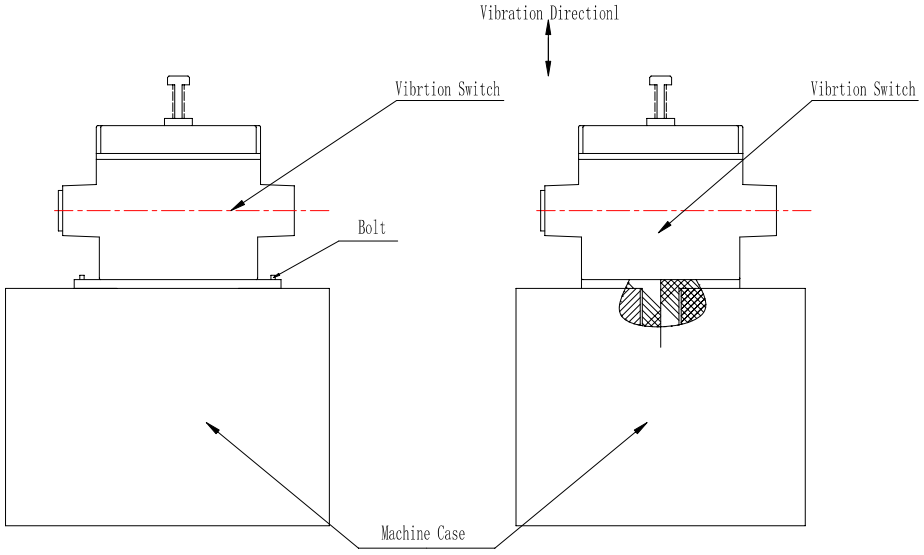
All dimensions in mm (inches)

PT500-13 **PT500-14** **PT500-15 (3/4" NPT)**

PT500-17 (M20×1.5)

Installation – Mechanical

PT500 has two different mounting plates and two different mounting studs. See figuration below. Be aware of that PT500 will sense the vibration in the vertical axis reference to the mounting plate.



Installation - Field-wiring Diagram

Switches

Each switch is SPDT. There are three pin out:

COM:

Common.

NC:

Normally Closed. It is normally connected with the COM. In alarm status, it is dis-connected from COM.

NO:

Normally Open. It is normally dis-connected with the COM. In alarm status, it is connected from COM.

Remote reset with start-up inhibit

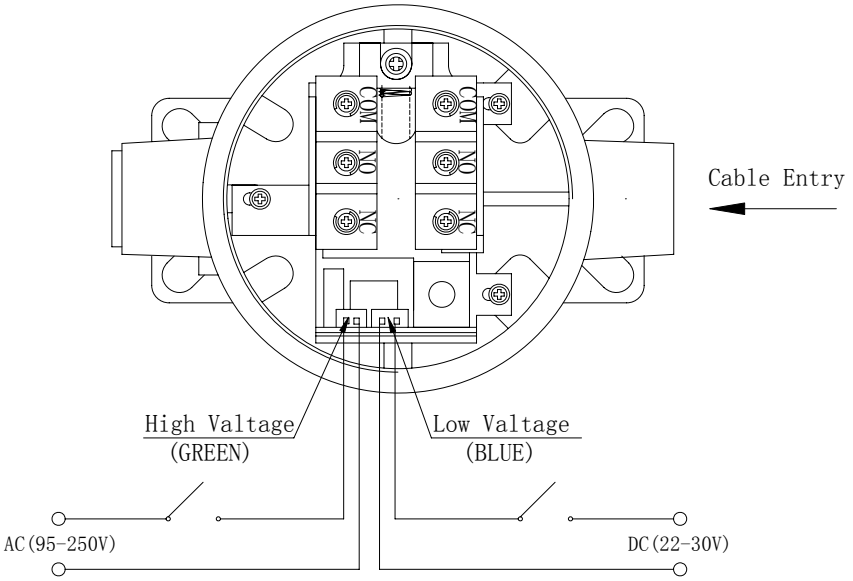
Two sets of power supply can be used for this function.

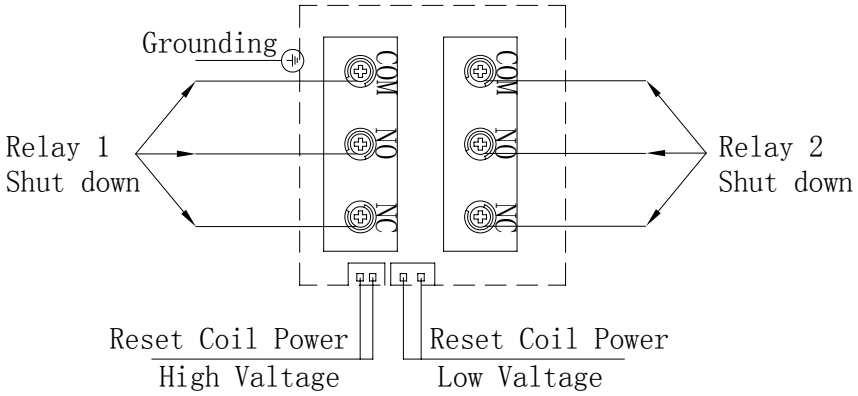
High Voltage(95～250VAC@100mA, 50~60Hz or 95～120VDC@100mA): Connect to high voltage pins. No polarity.

Low Voltage(20～30VDC@200mA): Connect to low voltage pins. No polarity.

Caution:

Never connect the high voltage power into low voltage connectors. It will destroy the reset circuit!

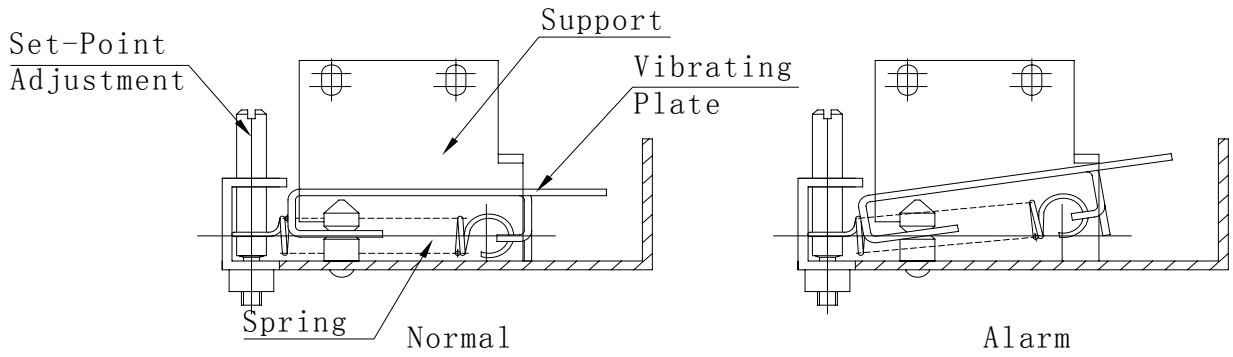




Operation

Principle of electro-mechanical vibration switch

The spring will hold the vibration plate into the bottom of the frame. Electronic switches are contacted with the plate.



If vibration level overpasses the force exerted by the spring, the vibration plate will flip upward; electronic switches will be switched on.

F(vibration)=m*a > F(spring) = z*D

Where F is the force; m is the effective mass of the vibration plate; a is the acceleration (vertical); z is the spring coefficient; and D is the effective displacement of the spring.

The set-point adjustment screw will move the spring up and down. It will in turn change the vertical component of the force generated by the spring. By adjust the set-point, vibration level is effectively adjusted.

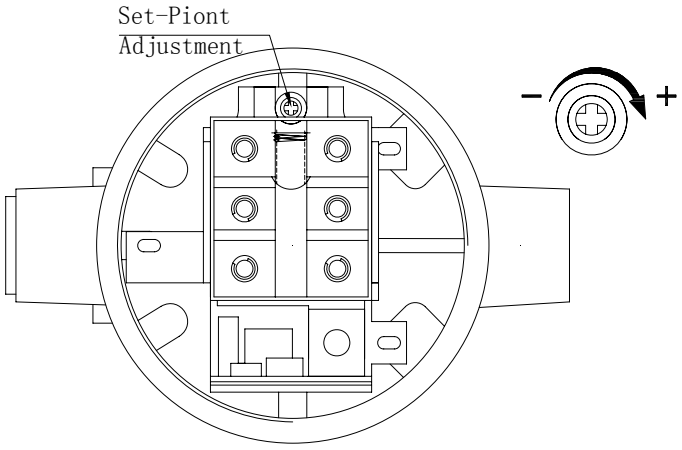
After the alarm, the spring will force the vibration plate in latching position until the vibration level decrease to normal and reset is performed.

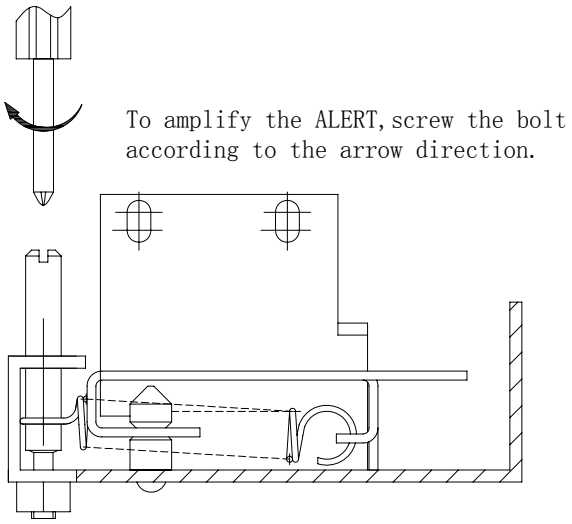
There are two ways to reset the switch. Local reset will mechanically push the vibration plate down to normal position.

Remote reset/inhibit will also push the plate to normal position. In addition, it will hold the switch in non-alarm situation until a 3 seconds delay. This is useful for machine start-up. It will avoid false alarms.

Set-point adjustment

- ✓ Mount the switch on machine. Let the machine running.
- ✓ Remove the switch cover. Disconnect any power. Wiring the switch.
- ✓ Push (reset) the vibration plate down to normal position.
- ✓ If the plate flips to alarm position after the reset, adjust the set-point screw clockwise until the plate back to normal position.
- ✓ Start the machine, when the machine has reached full speed, turn the set-point screw anti-clockwise slowly till the vibration plate flip to alarm position. Remember the set-point screw position.
- ✓ Turn the set point clockwise 1g per 45 degree (1/8 turns) **. Reset the switch.
- ✓ Mount the switch cover.

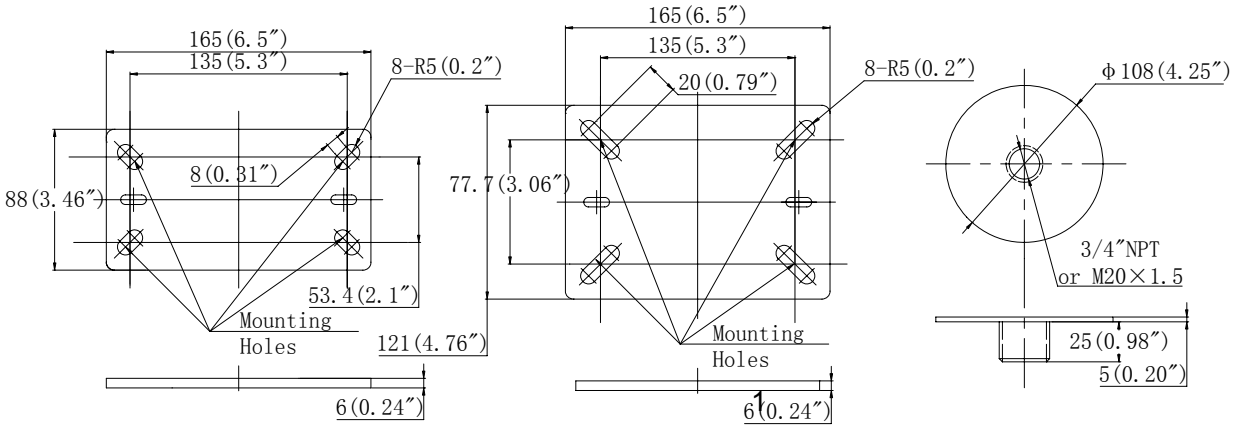




Maintenance

Accessories

Mounting Plate and mounting studs:



All dimensions in mm (inches)

PT500-13 **PT500-14** **PT500-15 (3/4” NPT)**

PT500-17 (M20×1.5)

3/4” NPT seal

PT500-18

3/4” NPT cable feedthrough

PT500-19

Blank cover

PT500-3

Remote reset circuit

PT500-20